Part 1 -- Claims

1. (Currently Amended) A varactor comprising:

a diode junction;

a depletion region adjacent to the diode junction; and

a doped region beginning at the diode junction, including the depletion region and having a nonuniform dopant concentration profile that continuously increases with increasing depth of the doped region starting from the diode junction and continuing to a peak concentration region at the deepest portion of the doped region;

and wherein the continuously increasing nonuniform dopant concentration profile causes the varactor to have an approximately linear capacitance/voltage response characteristic.

2. Canceled

3. (Previously Amended) A varactor as defined in claim 1 wherein:

the nonuniform dopant concentration profile is defined by an equation N=Bxexp(m), where N is the dopant concentration, x is the depth of the doped region, B is a concentration constant and m is an exponent that determines the degree of curvature of the dopant profile, and m is greater than 1.

4. Canceled

5. (Original) A varactor as defined in claim 3 wherein m is about 3.

6. (Previously Amended) A varactor as defined in claim 3 wherein:

B is in a range from about 1.0E13/cm3 to about 1.0E19/cm3; and

m is greater than one.

7. (Original) A varactor as defined in claim 6 wherein B is about 1.0E16/cm3.

8.-10. Canceled

11. (Withdrawn) A method of forming a varactor in a semiconductor substrate comprising:

forming a first doped region of a first dopant type with a nonuniform dopant concentration profile from a low-doped end of the first doped region to a high-doped end of the first doped region;

forming a second doped region of a second dopant type adjacent the low-doped end of the first doped region;

forming a diode junction between the first and second doped regions;

forming a depletion region in the first doped region adjacent the second doped region by reverse biasing the diode junction; and

establishing a capacitance between the first and second doped regions that is approximately linearly related to the reverse biasing.

12. (Withdrawn) A method as defined in claim 11 further comprising:

forming a conductive path to and from the varactor through the high-doped end of the first doped region.

13. (Withdrawn) A method as defined in claim 11 further comprising:

forming the first doped region with the nonuniform dopant concentration profile defined by an equation N=Bxm, where N is the dopant concentration, x is the depth of the doped region, B is a concentration constant and m is an exponent that determines a degree of curvature of the nonuniform dopant concentration profile.

14. (Withdrawn) A method as defined in claim 13 wherein m is greater than zero.

15. (Withdrawn) A method as defined in claim 13 wherein m is about 3.

16. (Withdrawn) A method as defined in claim 13 wherein:

B is in a range from about 1.0E13/cm3 to about 1.0E19/cm3; and

m is greater than zero.

17. (Withdrawn) A method as defined in claim 16 wherein B is about 1.0E16/cm3.